Generalized Impedance Boundary Conditions for Weakly Inhomogeneous Media

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The direct numerical solution of acoustic or electromagnetic scattering by penetrable obstacles is a challenging problem, in particular when the wavelength of the fields is much smaller that the size of the obstacle. When the media is such that the penetration of the waves is localized near the boundary of the obstacle, one can avoid solving the problem *inside* the obstacle by using so-called *impedance boundary conditions* (IBC), which approximate the solution by localizing the problem on its boundary [1].

In this talk we will present a generalized IBC for weakly inhomogeneous media, substantially improving the accuracy of standard low-order boundary conditions. The derivation of this IBC is based on microlocal asymptotic analysis, which provides a systematic way to construct such IBCs of various order on general surfaces.

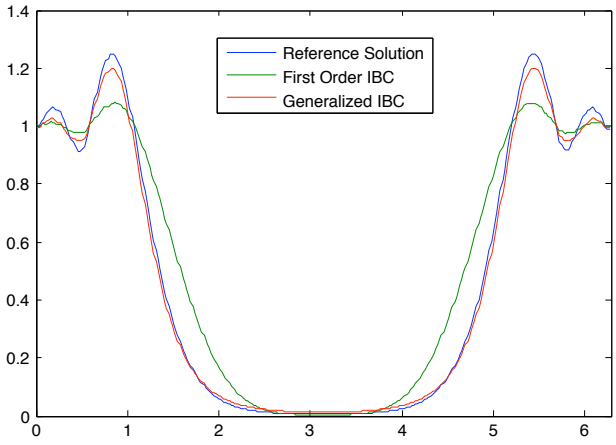

Figure 1: Trace of the solution on the boundary of a weakly inhomogeneous, penetrable cylindrical scatterer under plane wave incidence.

References

[1] T. B. A. Senior and J. L. Volakis. *Approximate Boundary Conditions in Electromagnetics*. IEEE Electromagnetic Waves, Serie 41, London, 1995.